A COMPARATIVE STUDY OF THE COMPLETION AND THE

TRUE-FALSE TYPES OF OBJECTIVE EXAMINATIONS

IN HIGH SCHOOL SOCIAL SCIENCE STUDIES.

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By

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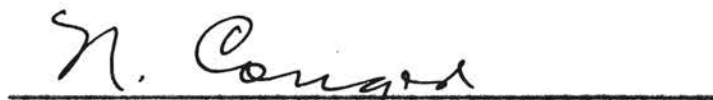
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CHAPTER I

INTRODUCTION

PURPOSE AND METHOD OF THIS STUDY

This comparative study of the true-false and the completion type of objective examinations was suggested by the following statements by Davis.

> Standardized educational tests furnish a valuable means for checking efficiency and measure improvement, but they should be supplemented by objective classroom examinations, which are more adaptable for quizzes, examinations and teaching devices...... The objective classroom examination emphasizes content peculiar to the particular course or subject, usually with no attempt to evaluate it on the basis of pupil performance. Since the classroom examination is peculiar to the local situation, it is more likely than the standardized test to be valid according to source.[1]

Continuing the discussion on objective classroom examinations, Davis further says

> Objective classroom examinations are divided into two general classes which may be designated as recall and recognition. Questions in recall examinations may be answered by one word, a short sentence or by the completion of sentences. The pupil is expected to search out and revive acquired material with the aid of cues. ..... Recognition examinations are so devised that the answers are provided and the pupil selects those believed to be correct. The emphasis is primarily upon the ability to recognize and identify correct answers. .... It has been assumed that recall tests place emphasis upon the acquisition of factual information while recognition examinations stress problem-solving ability and reasoning. Although neither of these claims has been experimentally verified, it is certain that the two types of tests measure different aspects of ability. Consequently, every examination should include both recall and recognition questions.[2]

The last statement in the foregoing quotation, "every

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[1] Robert A. Davis, Psychology of Learning, p. 407.

[2] Ibid., pp. 408-411.

examination should include both recall and recognition questions" has served to raise the question, To what extent would objective examinations of the recall type represented by the single completion test correlate with the recognition type as represented by the true-false form of this latter type? From the standpoint of the teacher faced with the task of testing pupils on materials covered in the class-room and for which the group of students is held responsi-ble, it naturally brings up the question as to whether a test of either the completion or true-false type would sufficiently measure the group so as to enable the teacher to base grades on the basis of pupil performance on that test. The question involved, is, to what extent could one predict a pupil's performance on a completion test knowing his performance on a true-false test, or vice versa?

This study concerns itself with the comparative re-sults to be obtained by using the completion type and the true-false type of objective examination in social science subjects under actual classroom conditions. Various studies have been made in regard to the use of objective examinations as reported by Ruch[3] and by Brinkley.[4] Most of these stud-ies have been technical experiments and have been made under experimental conditions.

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[3] G. M. Ruch, Objective Examination Methods in the Social Studies.

[4] S. G. Brinkley, Values of New Type Examinations in the High School.

Davis says "the classroom examination is peculiar to the local situation, and more likely than the standardized test to be valid according to the source."[5] I believe a study of classroom examinations, given over a period of a year's work should prove of value.

The procedure followed in making this study was to give a series of true-false and completion tests to two groups of high school students regularly enrolled in two of the Social Science courses in Wister High School. The first group was composed of Juniors and Seniors in the Ancient History course. The second group was composed entirely of Freshmen taking the course in Social Science I. This latter course includes one semester's work in Oklahoma History and one semester's work in Community Civics. The tests were given as groups of one hundred questions, of each of the true-false and the completion type, on each six weeks work and two hundred of each kind on the work covered during each semester. The questions included in the various tests were such questions as the teacher believed should be included in a test to determine the relative standings of the students, and for the purpose of giving six-week and semester grade marks to the students. All questions were taken from material that had been covered in the regular classwork, including text-book materials, outside readings, workbooks, special reports, mapwork etc. The larger part of the questions, of

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[5] Davis, op. cit. p. 408.

course, concerned themselves with such items as were found in the textbooks. The basically adopted Oklahoma textbooks were used in each of the classes; namely, World History in the Making, by McKinley, Howland, and Dann for Ancient History; A History of Oklahoma, by Buchanan and Dale for Oklahoma History; and Our Community Life, by King and Barnard for the course in Community Civics.

The three groups of tests over each six-weeks' work plus the two groups of tests given over the semester's work, with a total of one hundred true-false and one hundred completion questions in each group, made a total of one thousand questions of the true-false type and one thousand questions of the completion type over the year's work.

The scoring of the papers was done by the members of the groups tested, after exchanging papers. All marks made on the papers, including the name of the individual doing the scoring, were made with crayola. The correct answer to each question was given orally by the teacher, and in case there was doubt on the part of the scorer as to the correctness of the answer, the scorer was asked to place a circle around the number of that particular question, in order to enable the teacher to give special attention to such questions, while rechecking the papers. Students were not permitted to have or use a pencil or pen during the scoring to preclude possibility of changing any of the answers as made by the student taking the test. After scoring and before the papers were given to the teacher, the papers were given to the owner so that he might see his score, check the questions

missed and to give him an opportunity to question any check made on his paper which he might believe would be unfair to him. The papers were originally scored by members of the class in order to use the examination in the nature of a further review, the writer believing that items brought to the students' attention under examination conditions are retained better because of such emphasis having been placed on them.

From the standpoint of the pupils the examinations were given under ordinary classroom conditions. The students were not told that they were the subject of an experiment or study, but regarded the examinations as part of the regular classroom work, and knew that their performance on these tests would have considerable bearing on their six-weeks' and semester's grade marks.

Other tests of the written essay, multiple choice, matching type etc. were given during the course of the year's work, but these were given to supplement the tests used in this study for the purpose of aiding the teacher in giving grade marks to the students and are not evaluated in terms of results obtained through the true-false and completion tests.

The true-false tests were given with instructions to answer all questions and the score determined by subtracting the wrong responses from the right. This method of scoring has been criticized by Hahn[6] but as suggested by Barthel-

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[6] H. H. Hahn, A Criticism of Tests Requiring Alternative Responses, in Journal of Educational Research, Vol. 6 pp. 234-240.

mess

the best test of any test is the correlation with a criterion. If correlation is satisfactory, we can forget all minor criticisms concerning chance, etc.[7]

In making the questions for the tests the writer made every effort to state questions clearly and concisely. Tricky questions, so often given as a criticism of the objective type of examination especially of the true-false tests, were strictly avoided. Questions were stated so as to avoid several possible correct answers in the case of the completion tests and in the true-false tests an effort was made to have each question definitely true or definitely false. Brinkley points out that the need for making true-false tests definitely true or false

> constitutes a weakness in this form of test in that it precludes many questions relating to important ideas and "facts" with which a person has to do in actual life which are relative or contingent, and questions which are matters of opinion or are true or false under certain conditions.[8]

Each test was intentionally made sufficiently difficult to test even the best students. As will be shown in the next chapter only two students made scores of 100 on any test. Both of these perfect scores were made on true-false tests. No time limit was set for any of the tests, the pupil being permitted to finish all questions before handing in his paper. Pupils were permitted to ask the teacher questions concerning any item in the test which had not been

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[7] H. M. Barthelmess, Reply to a Criticism of Tests Requiring Alternative Responses, in Journal of Educational Research, Vol. VI, pp. 355-359.

[8] S. G. Brinkley, op. cit., p. 8.

worded or stated in such manner as to be understood by the student.

The total number of students taking the entire group of one thousand true-false and one thousand completion questions in the Ancient History course was twenty-five. Two students took part of the questions but withdrew from school due to removing from the community and their scores are not included as part of the data upon which this study is based. In the Social Science I group nineteen students took the entire group of questions with six students taking part of the questions but failing to take all of them, due to withdrawing from school and their scores, also, are not included in this data. The number of students in each of these groups is the ordinary number of students one finds enrolled in the various courses in the average small high school of Oklahoma. Wister High School had an average daily attendance of slightly over sixty during the 1936-37 school year.

SPECIFIC STATEMENT OF THE PURPOSE OF THIS STUDY

This comparative study is made to determine:

1. Comparative group performance of high school students in Social Science classes when achievement is measured by the true-false and the completion types of objective examinations.

2. Comparative individual performance of high school students in Social Science classes when measured by the true-false and the completion types of objective examinations.

3. If certain disabilities can be discovered making for poor performance on either type of test.

4. Effect of the length of the test upon reliability.

5. Possibility of correctly assigning or predicting grade marks or scores on basis of scores made on either true-false or completion type of objective examination.

CHAPTER II

RESULTS OF THE INDIVIDUAL TESTS

In this chapter are given the scores made by the individual members of the two groups to which the tests were given, and the correlations between each set of one hundred item tests are given and discussed. The members of the class in Ancient History are known as Group I and the members of the Social Science I class are referred to as Group II. Scores on the true-false test have been computed by subtracting the number of wrong responses from the number of right responses.

The scores for each of the groups are listed in tables, each table including the scores made on the tests given during a given semester. Table I gives the scores for Group I during the first semester and Table II gives the scores for this same group for the second semester. In like manner, Table III gives the scores for Group II for the first semester and Table IV gives the scores for Group II for the second semester. Each table includes the scores made on a total of five hundred true-false and five hundred completion questions.

TABLE I

GROUP I

Test No.	1		2		3		4		5	
Type	T-F	C	T-F	C	T-F	C	T-F	C	T-F	C
Pupil No.	Scores									
1	94	88	100	90	78	85	86	81	82	70
2	80	89	96	82	68	79	88	78	86	81
3	72	83	86	97	64	73	88	87	70	79
4	62	72	88	76	60	75	62	68	68	65
5	38	46	56	70	60	39	32	48	60	45
6	54	45	54	63	40	48	48	40	46	49
7	46	52	26	46	28	42	18	24	32	35
8	64	54	72	83	72	80	56	48	58	65
9	56	66	64	81	46	60	42	46	50	56
10	86	95	88	95	84	88	90	87	88	85
11	80	78	56	81	70	62	50	58	60	61
12	82	91	88	98	90	80	98	81	88	89
13	42	55	66	75	54	63	40	46	50	52
14	42	28	26	55	56	35	38	48	22	18
15	70	57	70	78	76	61	68	56	62	52
16	80	88	92	90	82	88	88	78	84	82
17	62	35	30	62	26	42	34	29	38	31
18	36	24	18	54	40	24	30	21	32	23
19	60	48	80	65	50	56	68	56	56	49
20	52	64	60	74	64	59	72	63	72	56
21	82	90	76	87	74	89	86	90	82	68
22	80	86	100	91	88	77	86	73	96	75
23	58	70	70	81	80	65	70	77	58	63
24	32	49	40	55	28	43	44	30	38	27
25	40	53	36	64	40	52	48	41	24	39

Throughout this entire work, wherever the Coefficient of correlation has been determined, the Pearson Product-Moment method as given by Benson[1] has been used exclusively. The formula is as follows:

$$\frac{\frac{\text{Sum of } x \text{ times } y}{N}}{\text{S. D. of } x \text{ times S. D. of } y}$$

where x equals the deviation of each score from an assumed mean in the first series of scores, y equals the deviation

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[1] Charles E. Benson, James E. Lough, Charles E. Skinner, and Paul V. West, Psychology for Teachers, p. 291.

of each score from an assumed mean in the second series of scores, N equals the number of cases tested, and S. D. equals the Standard Deviation.

The Coefficient of correlation between the two sets of scores on test No. 1 is .84. Nine of the twenty-five students made a higher score on the true-false test than they did on the completion test. The greatest difference in the scores made by any pupil on the two types of tests was 27 in favor of the true-false type in the case of pupil No. 17. The group performance on the true-false test was 2% lower than on the completion test, having a total of 1550 correct responses to 1606 on the completion type.

Test No. 2 showed the greatest variation in regard to individual and group performance. The Coefficient of correlation obtained between the true-false and completion test scores was .66 which was .11 lower than that obtained on any other correlation made in this study. The total group score on this test was 1638 for the true-false part to 1893 for the completion part, which means a 10.3% higher performance on the completion questions. Five of the students taking this test had a score of twenty or more points less on the true-false than on the completion test, with the greatest individual difference in scores being 36 points in the case of student No. 36. An effort to determine the cause of this irregular performance on the part of the students making these lower grades on the true-false part of the test brought the response that they didn't like true-false tests. This explanation was given, of course, after the student saw

his lower grade on the true-false test and no doubt these students were influenced in their opinions by this lower grade. None of these students showed any aversion to the true-false test during the rest of the school year, and all the students preferred the objective type examinations to the written essay type. In correlating the scores made on the true-false part of test No. 1 with the scores made on the true-false part of test No. 2 one obtains a coefficient of .96 which is decidedly higher than the coefficient of correlation between the completion parts of the same two tests, the latter coefficient being .79. Five of the students made a higher score on the true-false questions than they did on the completion questions.

The coefficient of correlation between true-false and completion scores made on test No. 3 was .77 which was the second lowest obtained in this study. The group score on the true-false questions was 1.9% lower than on the completion questions. The most erratic individual student performance on this test was made by student No. 5 who made a total of 21 points lower on the completion test questions. The next most erratic performer was student No. 14 who scored 19 fewer points on the completion questions. Eight of the students scored higher on the true-false part of the test than they did on the completion part. The total group scores were 1518 on the true-false questions to 1565 on the completion questions.

The results of tests 4 and 5 differ from those obtained in the other tests in that higher scores were made on the

true-false tests than on the completion tests, the group scores being 1530 to 1454 and 1502 to 1415 respectively. Expressed in terms of percentage the group scores were 3.1% higher for the true-false part of test 4 and 3.3% higher in the case of test 5. Sixteen of the students made higher grades on the true-false questions than they did on the completion questions in test 4 and 15 had higher scores on the true-false part of test 5.

The coefficient of correlation between the true-false and the completion test scores in the case of test 4 was .88 which was the highest yet obtained, while test 5 showed a still higher coefficient of correlation of .89. The extremes of the scores made by an individual student in test 4 was a difference of 17 in the case of student No. 12, student No. 5 being a close second with difference in score of 16. The greatest difference in individual scores in test 5 occurs in the case of student No. 22 whose score on the completion test was 22 points lower than his true-false score.

TABLE II

GROUP I

Test No.	1		2		3		4		5	
Type	T-F	C	T-F	C	T-F	C	T-F	C	T-F	C
Pupil No.			Scores							
1	86	91	92	93	82	88	80	85	90	92
2	80	84	82	69	76	64	82	88	86	77
3	74	81	82	77	86	79	78	83	88	94
4	78	85	70	79	64	73	76	81	80	87
5	62	52	40	49	60	61	68	64	78	72
6	50	46	46	53	60	67	64	65	72	69
7	40	31	50	60	38	47	52	60	48	43
8	66	76	70	63	70	77	74	82	80	83
9	72	80	70	69	68	59	80	76	64	59
10	94	91	88	79	76	82	92	96	90	91
11	68	57	64	59	60	65	74	72	64	73
12	90	96	88	82	88	86	92	91	84	95
13	50	61	58	63	48	59	60	53	72	65
14	46	38	48	52	56	48	58	63	70	69
15	70	72	60	67	58	63	78	77	74	75
16	90	95	78	87	80	88	86	90	88	83
17	50	61	60	59	48	43	66	68	64	54
18	30	34	40	47	44	49	46	51	38	44
19	78	69	58	65	50	56	64	61	54	52
20	58	68	52	61	48	55	70	77	74	78
21	86	93	80	87	86	84	92	89	86	90
22	88	91	80	82	84	84	92	85	84	92
23	76	87	80	78	72	71	84	90	72	76
24	38	48	50	51	50	57	46	54	36	41
25	42	53	48	62	58	49	52	47	46	38

Test No. 6 showed a higher coefficient of correlation than that obtained on any other set of individual tests correlated, a coefficient of .98 being shown. The erratic performance of individual students on some of the earlier tests are noticeably absent, the greatest difference in individual scores on the two types of tests being 11 points. Five of the students, numbers 11, 13, 17, 23, and 25 all had this difference of 11 points in their scores. Seven of the students made higher scores on the true-false questions than they did on the completion questions. The group

performance was 3.1% higher on completion questions than on the true-false test, with a total 1740 correct responses on the completion questions and 1662 correct responses on the true-false questions.

The coefficient of correlation for the true-false test scores and the completion scores on test No. 7 was .90. This is 1 point higher than any obtained on any of the tests given during the first semester but is next to the lowest for the groups of tests given to group 2 during the second semester. The total group score was 1634 on the true-false as compared to 1693 on the completion test, with the percentage difference being 2.3% in favor of the completion group of questions. The greatest individual score difference was 19 which is true in case of student No. 11. Only four students score higher on the true-false test than they did on the completion test. This was the lowest number of higher individual true-false test scores found in any of the ten groups of tests given to this group, although it is only one lower than the five higher true-false scores made in the case of test No. 2.

Test No. 8 shows a .89 coefficient of correlation between the scores made on the two types of tests, with extremes in comparative scores made by individual students again being rather low. Two students had scores on the two tests 11 points apart. Eight individual students' true-false scores were higher than the scores made by those same students on the completion questions. The total true-false

score was 1610 as compared to 1654 scored on the completion tests, with a percentage advantage of 1.8% in favor of the completion tests. The Correlation coefficient of .89 was the lowest found for this group for all tests given during the second semester.

Both tests 9 and 10 showed correlation coefficients of .96 which was second highest found for this group during the entire year's work. Test 9 showed the lowest individual score differences with two students, numbers 7 and 8, having score differences of only eight points as the extremes in this respect. Test 9 showed 1806 correct responses on the true-false tests as compared to 1848 on the completion group of questions, with the percentage of correct responses favoring the completion test by a margin of 1.7%. In test 10 we find the total true-false score 1782 as compared to 1792 completion test score. The greatest margin between scores made by any individual on the two types of questions was 11 in the case of student No. 12.

TABLE III

GROUP II

Test No.	1		2		3		4		5	
Type	T-F	C	T-F	C	T-F	C	T-F	C	T-F	C
Pupil No.				Scores						
1	30	35	40	48	38	28	32	46	40	49
2	22	34	36	23	48	36	30	29	46	37
3	62	68	58	69	60	48	58	58	52	45
4	66	59	60	62	64	52	50	61	58	57
5	82	72	78	74	60	50	62	71	82	77
6	38	43	58	51	44	38	38	31	34	64
7	72	59	76	75	58	51	48	42	68	73
8	86	86	78	78	68	54	80	76	74	69
9	94	90	96	95	80	83	82	91	82	88
10	22	30	40	33	28	23	42	53	32	39
11	38	59	40	66	42	28	36	52	50	61
12	78	75	76	76	62	57	72	65	60	69
13	30	45	46	58	30	30	38	32	40	47
14	70	56	44	55	46	43	68	61	52	57
15	86	76	70	82	58	54	80	83	72	73
16	80	78	84	77	64	56	92	79	72	71
17	48	59	42	59	34	42	64	55	52	57
18	96	91	88	82	84	73	80	87	78	84
19	42	65	60	46	36	43	68	63	48	51

As previously stated Table III gives the scores made
on the tests given to the members of the Social Science I
group of students during the first semester. The coeffici-
ent of correlation on the set of scores on the first test
given to this group was .94. Nine of the students made a
higher score on the true-false test with one student having
identical scores. The group performance was 2.1% lower on
the true-false test than on the completion test with 1142
correct responses on true-false questions to 1180 on the
completion group. The greatest individual score difference
for any student was 21 for student No. 11.

Test No. 2 scores correlated .84 with nine of the 19
students having higher true-false scores than completion

scores and two students having identical scores. Group performance was 2.1% lower on the true-false test with 1170 correct responses to 1209 for the completion test.

The scores on the true-false part of test No. 3 show a correlation of .89. This test was the only test on which this group scored higher on the true-false test than they did on the completion test, with 1004 correct true-false responses to 889 correct answers on the completion test. In terms of percentage the group scored 6.1% higher on the true-false group of questions.

On test 4 the correlation was .88 with the group scoring a total of 1120 correct true-false answers to 1135 correct responses on the completion test, an advantage of .7% in favor of the latter. Nine of the individual students made higher scores on the true-false test with the greatest individual score difference for any student occurring in the case of student No. 1. One student had identical scores.

Test No. 5 showed a correlation of .82 which was the lowest obtained for this group on any of the tests given to this group during the entire years work. The group scored a total of 1092 correct responses on the true-false type test to 1168 on the completion test, which was 4% higher in the case of the completion tests. Student No. 6 had a 30 point higher score on the completion questions than he had on the true-false questions. This was an exceptionally large difference as compared to the next greatest difference of 11 points in the case of student No. 11. Six students had higher scores on the true-false test than on the completion test.

TABLE IV

GROUP II

Test No.	1		2		3		4		5	
Type	T-F	C	T-F	C	T-F	C	T-F	C	T-F	C
Pupil No.	Scores									
1	52	45	58	63	40	47	54	66	46	53
2	52	58	50	57	48	37	42	49	52	43
3	48	56	74	71	62	70	56	65	48	66
4	70	71	64	73	80	81	82	74	60	69
5	84	87	82	85	84	86	80	80	78	85
6	36	46	44	51	46	59	54	63	60	61
7	54	51	78	75	76	71	78	67	80	73
8	70	73	72	81	66	73	74	77	86	81
9	86	76	76	83	90	85	82	87	80	87
10	56	49	42	52	40	47	46	57	50	43
11	68	78	70	70	74	80	64	73	68	69
12	60	65	64	72	68	69	70	77	80	83
13	52	61	56	49	44	55	54	61	46	51
14	72	75	72	79	78	77	56	67	58	65
15	80	85	82	87	80	83	86	87	88	90
16	88	86	72	81	82	92	80	90	88	86
17	60	66	54	62	60	71	58	66	66	61
18	78	89	80	88	82	94	84	90	88	90
19	44	56	66	75	52	61	48	57	54	63

The scores on test 6 show a total of 6 students making higher grades on the true-false type of examination than on the completion type. The correlation coefficient for the two sets of scores was .89. The total group score was 1210 on the true-false test to 1273 on the completion test. The percentage of correct responses was 3.3% higher in the case of the completion test. Student No. 19 had the greatest difference in his scores, a total of 11 points.

The coefficient of correlation for the scores on test No. 7 was .90. The total correct group responses was 5.2% greater in the case of the completion test with 1354 correct answers to 1256 on the true-false test. Student No. 10 had a ten point difference in his scores which was the great-

est margin on this test.

The total group score on test 8 was 4.4% higher on the completion test than on the true-false test, with 1338 correct answers 1252 on the true-false test. The coefficient of correlation was .90. The greatest difference in individual scores was 13 points in the case of student No. 3. Four students had higher true-false scores than completion scores.

The lowest coefficient of correlation obtained on any two sets of scores was shown on test 9 with a coefficient of .85. Student No. 1 has a comparative score difference of 12 points which was the greatest difference for any individual. The group scored 5.4% higher on the completion test with 1353 correct responses to 1248 in the case of the true-false type test.

The highest correlation for any of the tests given to group II during the second semester was found in test 10, with a coefficient of .92. Student No. 3 had the largest difference in his comparative scores, a total of 18 points. Group performance was 2.2% higher on the completion test, with 1318 correct completion responses to 1276 correct true-false responses.

SUMMARY OF INDIVIDUAL TEST RESULTS
GROUP I

The mean for the coefficients of correlation for the ten tests given to group I was .873. Out of a total of 250 comparative scores recorded for this group, 93 true-false scores were higher than the corresponding completion score, while 157 completion scores were higher than the corresponding true-false score. The total group score on the true-false tests was 16,232 with the group score on the completion tests totalling 16,660 a percentage advantage of 1.71% in favor of the completion tests.

GROUP II

The mean for the coefficients of correlation for the ten tests given to Group II was .883. Out of a total of 190 comparative scores recorded for this group, 69 true-false scores were higher than the corresponding completion score, while 114 completion scores were higher than the corresponding true-false scores, of students having identical scores. The total group score on the true-false tests was 11,770 with the group score on the completion tests totalling 12,217 a percentage advantage of 2.35% in favor of the completion tests.

Group No. I (25 Students)	Individual Test Number									
	1	2	3	4	5	6	7	8	9	10
Coefficient of Correlation	.84	.66	.77	.88	.89	.98	.90	.89	.96	.96
True-False Scores Exceeding Completion	9	5	8	16	15	7	4	8	10	11
Completion Scores Exceeding True-False	16	20	17	9	10	18	21	17	15	14
Total True-False Scores	1550	1638	1518	1530	1502	1662	1634	1610	1806	1782
Total Completion Scores	1606	1893	1565	1454	1415	1740	1693	1654	1848	1792
Mean True-False Score	62	65.5	60.7	61.2	60.1	66.5	65.4	64.4	72.2	71.3
Mean Completion Score	64.2	75.7	60.6	58.2	56.6	69.6	67.7	66.2	73.9	71.6

TABLE V

SHOWING COMPARATIVE GROUP I PERFORMANCES ON INDIVIDUAL TESTS

Group II (19 Students)	Individual Test Number									
	1	2	3	4	5	6	7	8	9	10
Coefficient of Correlation	.94	.84	.89	.88	.82	.89	.90	.90	.85	.92
True-False Scores Exceeding Completion	9	9	16	9	6	5	3	4	2	6
Completion Scores Exceeding True-False	9	8	2	9	13	14	15	15	16	13
Total True-False Score	1142	1170	1004	1120	1092	1210	1256	1252	1248	1276
Total Completion Score	1180	1209	889	1135	1168	1273	1354	1338	1353	1318
Mean True-False Score	60.1	61.6	52.3	58.9	57.5	63.7	66.1	65.9	65.6	67.2
Mean Completion Score	62.1	63.6	46.8	59.8	61.5	67	71.3	70.4	71.2	69.4

TABLE VI

SHOWING COMPARATIVE GROUP II PERFORMANCES ON INDIVIDUAL TESTS

CHAPTER III

COMPOSITE RESULTS OF THE TESTS

Before making an analysis of the comparative
composite scores made by the members of the two groups
of students tested, the writer gives a number of quot-
ations taken from authorities in the field of the New-
Type objective examinations. These quotations will
help us to understand the viewpoint of present-day ed-
ucators regarding the value of the true-false and com-
pletion type tests for use in measuring pupil achiev-
ment in the classroom.

Davis has already been quoted, on pages one and
two of this thesis, to the effect that the recall type
test represented by the completion examination and the
recognition type test represented by the true-false ex-
amination

> measure different aspects of ability. Con-
> sequently, every examination should include
> both recall and recognition questions.[1]

In discussing the true-false test in regard to
its use by the classroom teacher in an unstandardized
form, Benson makes the following statement:

> Because of the fact that an individual may make
> a fairly good score by the process of guessing
> alone, without knowing the answers for any item,
> the true-false test is recognized as being unre-
> liable for arriving at individual scores, although

---

[1] Davis, op. cit. pp. 407-408-411

the average scores of groups may be comparable.[2]

Odell[3] says of the true-false type test:

> They are relatively easy to construct, can be ans-
> wered rapidly, and call for a certain kind of crit-
> ical ability that is worth testing.

Ruch[4] who reported on an experiment conducted by

DeGraff comes to the following conclusions:

> Of the six types of objective examinations used
> in this study, the recall is the most reliable.
> Of the recognition types, the five-response and
> seven-response tests are about equal in ranking
> as to reliability, while the two-response and
> true-false types are almost uniformly the most
> unreliable.

Gates[5] made a study of examinations and concludes

as follows:

> The true-false test thus appears all things con-
> sidered, to be the most reliable single measure of
> achievment.

We find thus, no uniformity of opinion regarding

the relative merits of the true-false and completion

type tests, nor of their place in a testing program.

It is not the purpose of the present study to find the

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[2] Charles E. Benson, James E. Lough, Charles E. Skin-
ner and Paul W. West, Psychology for Teachers, Re-
vised Edition, p. 301

[3] C. W. Odell, Educational measurement in High School
p. 489

[4] Ruch, op. cit. p. 88

[5] A. I. Gates, The True-False Test as a Measure of A-
chievment in College Courses, in Journal of Educa-
tional Psychology, Vol 12, pp. 276 ff.

ultimate conclusion in regard to the reliability of
the true-false or the completion type tests but it is
hoped that small contribution may be made which added
to needed numerous other studies of like nature may
finally permit making definite conclusions.

Any critical analysis of the composite scores made
on the series of test given during the course of this
study, should probably begin with a determination of
the coefficient of correlation between the T-F & C
scores made by the members of the two groups of stu-
dents tested in this study. Analysis is first made
of the data obtained by means of the tests given to
Group I.

Throughout this chapter wherever the Probable Er-
ror of the coefficient of correlation has been deter-
mined the formula as given by Garrett[6] has been used
exclusively. The formula is as follows:

$$PE_r = \frac{.6745x(1-r^2)}{\sqrt{N}}$$

where r equals the coefficient of correlation and N
equals the number of cases tested.

CORRELATIONS OF COMPOSITE GROUP I SCORES.

CORRELATION BETWEEN TOTAL SCORES.

Table VII gives the total scores made by each stu-
dent in Graph I, on the entire group of 1000 true-false
and 1000 completion questions.

---

[6] H. E. Garrett, Statistics in Psychology and Edu-
cation, p. 170.

TABLE VII
GROUP I

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	870	863	10	876	889	18	354	371
2	824	791	11	646	666	19	618	577
3	788	833	12	888	889	20	622	655
4	708	761	13	540	592	21	830	867
5	554	546	14	462	454	22	878	836
6	534	545	15	686	654	23	720	758
7	378	440	16	848	869	24	402	455
8	682	711	17	478	484	25	434	498
9	612	652						

The coefficicient of correlation for the scores as listed in Table VII is .98, PE=.0053 an extremely high correlation and indicates approximately identical performances on the part of each individual student over the entire group of 1000 questions of each of the two types submitted.

RELIABILITY OF T-F & C TESTS

In order to determine the reliability of the true-false questions as a separate group and the completion questions as a separate group and the completion questions as a separate group the list of ten tests as given was broken into two groups. The scores made by each student on the odd-numbered true-false tests were totalled and likewise the scores made on the even-numbered tests were totalled. Table VIII gives these totals for the true-false tests.

TABLE VIII

Pupil No.	T-F	C	Pupil	T-F	C	Pupil	T-F	C
1	426	444	10	438	4438	18	184	170
2	398	426	11	348	298	19	288	330
3	366	422	12	440	448	20	310	312
4	326	382	13	264	276	21	410	420
5	266	288	14	410	438	22	436	442
6	250	284	15	346	340	23	360	360
7	208	170	16	410	438	24	194	208
8	338	344	17	242	236	25	204	230
9	302	310						

The correlation coefficient was found to be .97 PE=.008 showing a high degree of reliability for the true-false questions as given in this study.

To check the reliability of the Completion type questions, the scores made by the students on the completion questions of the odd-numbered tests were correlated with the scores made on the even-numbered tests and the coefficient was found to be .96, PE=0106 indicating a high degree of reliability for the completion questions of the Group I students. Table IX gives the scores of the students as arranged for checking the reliability of the Completion questions.

TABLE IX

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil NO	T-F	C
1	421	442	10	443	446	18	169	202
2	406	385	11	332	334	19	279	298
3	396	395	12	443	446	20	317	338
4	389	385	13	286	306	21	423	444
5	243	303	14	196	258	22	405	413
6	260	285	15	324	334	23	365	393
7	249	191	16	435	434	24	224	231
8	347	364	17	235	249	25	253	245
932	327	325						

DETERMINING POSSIBLE DIFFERENTIAL BETWEEN T-F AND C TESTS

As a check against any differential in preparation, teaching, conditions under which tests were given etc., the scores made by the students on the odd-numbered true-false tests were correlated with the completion scores on the odd-numbered tests. Table X gives the scores under this combination.

TABLR X

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	426	421	10	438	443	18	184	169
22	398	406	11	348	332	19	288	279
3	366	396	12	440	443	20	310	317
4	326	389	13	264	286	21	410	423
5	2666	243	14	226	196	22	436	405
6	250	260	15	346	324	23	360	365
7	208	249	16	410	435	24	194	224
8	338	347	17	252	235	25	204	253
9	302	327						

The coefficient of correlation in this instance was .93 PE=.0182. This coefficient was so near that obtained for the other correlations that it would seem no unusual factors affected the scores made on the odd numbered tests.

The procedure followed in correlating the true-false scores with the completion scores in the odd-numbered tests was now repeated for the even numbered tests with a resulting coefficient of correlation of .97 PE=.008 This again would indicate that no unusual factors affected the scores made on the even numbered tests as compared with the total test situation. Table XI gives the scores for this correlation.

TABLE XI

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	444	442	10	438	446	18	170	202
2	426	385	11	298	334	19	330	298
3	422	395	12	448	446	20	312	338
4	382	385	13	276	306	21	420	444
5	288	303	14	236	258	22	442	431
6	284	285	15	340	334	23	360	393
7	170	191	16	438	434	24	208	231
8	344	364	17	236	249	25	230	245
9	310	325						

All of the coefficients of correlation in which
totals for five tests are compared with totals of five
other tests are lower than the coefficient of .98 ob-
tained when the entire group of 1000 true-false ques-
tions are correlated with the entire group of 1000 com-
pletion questions. This probably is due to the fact
that a greater and more nearly correct sample is had in
asking 1000 questions than in asking 500.

CORRELATIONS OF COMPOSITE GROUP II SCORES

CORRELATION BETWEEN TOTAL SCORES.

The procedure for checking the relationship be-
tween composite scores and the reliability of the tests
given to Group I of the students was duplicated in
checking the relationship between composite scores and
the reliability of the tests submitted to the students
in Group II.

Table XI gives the total scores made by each stu-
dent in Group II on the entire group of 1000 true-false
and 1000 completion questions.

TABLE XII

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	430	480	8	754	748	14	616	635
2	426	403	9	848	865	15	782	800
3	578	616	10	398	426	16	802	796
4	654	659	11	550	636	17	538	598
5	772	767	12	690	708	18	838	867
6	452	507	13	436	489	19	518	580
7	688	637						

The coefficient of correlation for the scores as listed in Table XII is .97 PE=.0091 which again is an extremely high correlation and indicates close relationship in the ability of each individual student to perform on the true-false and completion types of tests.

RELIABILITY OF T-F & C TESTS

The procedure followed, in the analysis of the scores made by group I was followed in order to determine the reliability of the questions submitted to Group II. In checking the scores made on the odd-numbered true-false tests against the scores made on the even-numbered true-false scores a coefficient of correlation of .97 PE=.0091 is obtained indicating high reliability of true false questions. Table XIII lists the scores made by the students on odd-numbered tests and the corresponding even-numbered test scores.

TABLE XIII

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	220	210	8	374	380	14	296	320
2	208	218	9	414	434	15	384	398
3	304	274	10	170	228	16	368	434
4	334	320	11	264	286	17	246	292
5	386	390	12	334	356	18	422	418
6	214	238	13	210	226	19	240	278
7	354	334						

The reliability of the completion questions was
next determined by checking the scores made on odd-num-
bered tests against those made on the even numbered
tests and the coefficient of correlation was found to
be .96, PE.0119 again indicating high reliability on
the part of the completion questions. Table XIV gives
the scores of the students as used in checking the re-
sults of the 5 odd-numbered completion tests against
the results of the 5 even-numbered completion tests.

TABLE XIV

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	241	239	8	367	387	14	302	314
2	225	201	9	431	417	15	377	405
3	297	281	10	201	197	16	376	426
4	315	339	11	291	259	17	286	242
5	364	408	12	350	340	18	426	406
6	259	193	13	232	204	19	297	227
7	325	363						

DETERMINING POSSIBLE DIFFERENTIAL BETWEEN T-F & C TEST

The factor of differential preparation, teaching,
conditions under which the test was taken, etc. for
the odd-numbered and even-numbered tests was weighted

by correlating scores on the 500 true-false questions
on the odd-numbered tests with the corresponding com-
pletion questions. The resulting coefficient was .95
PE.0151 indicating no chance factor had operated to dis-
tort the results of correlations within the odd-num-
bered tests. Table XV gives the scores of the students
on the odd-numbered tests.

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	220	241	8	374	367	14	296	302
2	208	225	9	414	431	15	384	377
3	304	297	10	170	201	16	368	376
4	334	315	111	264	291	17	246	286
5	386	364	12	334	350	18	422	426
6	214	259	13	210	232	19	240	297
7	354	325	13					

The even-numbered true-false test scores were now
correlated with the even-numbered completion test
scores with a resulting coefficient of correlation of
.95, PE.o151 which would indicate that conditions
were relatively constant as between the odd-numbered
and the even-numbered tests, and would permit the
assumption that correlating true-false with true-false
or comp vs comp in the even-numbered against odd-num-
bered tests is a valid procedure in determining the
reliability of the true-false or the completion ques-
tions. Table XVI gives the student scores used in
correlating the even-numbered true-false with the ev-
en numbered completion questions.

TABLE XVI

Pupil No.	T-F	C	Pupil No.	T-F	C	Pupil No.	T-F	C
1	210	239	8	380	387	14	320	314
2	218	201	9	434	417	15	398	405
3	274	281	10	228	197	16	434	426
4	320	339	11	286	259	17	292	242
5	390	408	12	356	340	18	416	406
6	238	193	13	226	204	19	278	227
7	334	363						

SUMMARY OF
COMPOSITE CORRELATIONS FINDINGS AND PROCEDURE FOR DETER-
MINING THE RELIABILITY OF EACH TYPE OF QUESTIONS SUBMITTED

1. Coefficient of correlation for 1000 true-false
questions and 1000 completion questions submitted to
group I was .98 PE.0053

2. Reliability of true-false questions estab-
lished by correlating true-false scores on odd-num-
bered tests with true-false scores on even-numbered
tests with resulting coefficient of .97 PE.008

3. Reliability of completion questions estab-
lished by correlating scores on odd-numbered tests
with completion scores on even-numbered tests with re-
sulting coefficient of .96 PE.0106

4. Possible differential in student preparation,
teaching, and varying examination conditions, as be-
tween the odd-numbered and even-numbered tests checked
by correlating the true-false against completion ques-
tions in the odd-numbered tests with resultant correl-
ation coefficient of .93, PE.0182 and checking true-
false against completion in the even-numbered tests

with resulting correlation coefficient of .97 PE.008

5. Higher coefficient obtained when the entire group of 1000 true-false questions are correlated with the entire group of 1000 completion questions than is obtained when 500 true-false questions are correlated with 500 completion questions may be explained by the fact that a larger sample is measured in the case of the 1000 questions tests.

6. Coefficient of correlation for 1000 true-false questions and 1000 completion questions submitted to Group II was .97. PE.0091

7. Reliability of true-false questions submitted to Group II established by correlating true-false scores on odd-numbered test with resulting coefficient of .96 PE.0119

8. Reliability of completion questions established by correlating scores on odd-numbered completion tests with completion scores on even-numbered tests with resulting coefficient of .96 PE.0119

9. Differential in student preparation, teaching, varying examination conditions etc., as between odd-numbered and even-numbered tests checked by correlating the true-false against completion questions in the odd-numbered tests with correlation coefficient of .93 PE.0209 and checking true-false scores against completion scores in the even-numbered tests with resulting correlation coefficient of .97. PE.0091

10. Higher coefficient of correlation obtained
when entire group of 1000 true-false questions are
correlated with the total of 1000 completion questions,
than is found when the smaller number of test ques-
tions are correlated by the fact that a larger sample
is measured in the case of the 1000 question correla-
tions.

11. Coefficient of correlation of .98 PE.0053
when Group I total scores are correlated, averaged
with the coefficient of correlation of .97 PE.0091 when
Group II total scores are correlated gives mean coef-
ficient of .975. PE.0072

Table XVII
TABLE SHOWING COMBINATIONS OF SCORES CORRELATED AND COEFFICIENTS OBTAINED

Combinations of Scores Correlated	Coefficient of Correlation		Mean Coefficient of Correlation
	Group I	Group II	
Total scores made on entire group of 1000 True-False questions with total scores made on entire group of 1000 completion questions.	.98PE.0053	.97PE.0091	.975PE.0072
Total scores made on 500 True-False questions in odd-numbered tests with total scores made on 500 True-False questions in even-numbered tests.	.97PE.008	.96PE.0119	.965PE.01
Total scores made on 500 completion questions in odd-numbered tests with total scores made on 500 completion questions in odd-numbered tests.	.96PE.0106	.96PE.0119	.96PE.0113
Total scores made on 500 True-False questions in odd-numbered tests with total scores made on 500 Completion questions in odd-numbered tests.	.93PE.0182	.93PE.0209	.93PE.0195
Total scores made on 500 True-False questions in even-numbered tests with total scores made on 500 Completion questions in even-no. tests.	.97PE.008	.97PE.008	97PE.0086

INFLUENCE ON COEFFICIENT OF CORRELATION
BY INCREASING NUMBER OF ITEMS IN TEST.

Symonds[7] in discussing the value of the true-false
test in measuring classroom achievement states:

> In general true-false tests are not very reli-
> able unless 100 or more statements are included.

In order to determine the increase in the coef-
ficient of correlation between true-false and comple-
tion questions as the number of items in each test is
increased the writer combined the scores made by the
students on successive tests of 100 questions and de-
termined the following relationships.

Group I

1. Mean correlation coefficient of ten tests
given to this group was .873 with extremes ranging
from .66 to .98

2. Combining the true-false scores made on first
and second tests and correlating with the combined cor-
responding completion scores resulted in a coefficient
of correlation of .90

3. Combining the true-false scores made on the
first, second and third tests and correlating with the
corresponding completion scores resulted in a coeffi-
cient of correlation of .90

---

[7] P. M. Symonds, Measurement in Educ., p. 27

4. Combining the true-false scores made on the first, second, third, and fourth tests and correlating with the corresponding Completion test scores resulted in coefficient of correlation of .93

5. Combining the true-false scores made on the first, second, third, fourth, and fifth tests and correlating with the corresponding Completion test scores resulted in a coefficient of correlation of resulted in coefficient of correlation of .95

6. Coefficient of correlation between 1000 true-false questions and 1000 completion questions was, as previously stated in this chapter, .98

GROUP II

1. Mean of correlation coefficients of ten tests given to this group was .883 with extremes ranging from .82 to .94

2. Combining the true-false scores made on the first, and second tests and correlating with the combined corresponding completion scores resulted in a coefficient of .897

3. Combining the true-false scores made on the first, second, and third tests and correlating with the corresponding completion test scores resulted in a coefficient of correlation of .93

4. Combining the true-false scores made on the first, second, third, and fourth tests and correlat-

ing with the corresponding completion test scores re-
sulted in a coefficient of correlation of .93

5. Combining the true-false scores made on the
first, second, third, fourth, and fifth tests and cor-
relating with the corresponding completion test scores
resulted in a correlation coefficient of .95

6. Coefficient of correlation between 1000 true-
false questions and 1000 completion questions was, as
previously stated in this chapter, .97

On the basis of the foregoing data the assump-
tion may be made that comparative tests including only
100 items the range of the coefficient of correlation
is rather great, in the case of the tests included
in this study, the range being from .66 to .98. By
increasing the number of items to 200 the fluctuation
of the coefficient of correlation is greatly reduced
and the coefficient raised to approximately .90. Fur-
ther increases in the number of itesm in each test
show an increase in the coefficient of correlation un-
til the total of 1000 items in each type of questions
results in a mean coefficient of .975 for the two
groups.

TABLE XVIII

Total No. of Questions Correlated	Coefficient of Correlation		
	Group I	Group II	Mean
Mean of ten individual tests	.873	.883	.878
200 T-F vs. 200 C	.90	.897	.899
300 T-F vs. 300 C	.90	.93	.915
400 T-F vs. 400 C	.93	.93	.93
500 T-F vs. 500 C	.95	.95	.95
1000 T-F vs. 1000 C	.98	.97	.975

TABLE SHOWING CHANGES IN COEFFICIENT OF CORRE*
LATION BY INCREASING NUMBER OF ITEMS IN A TEST.

SIGNIFICANCE OF COEFFICIENT OF CORRELATION IN RAT-
ING TESTS TO WHICH THEY APPLY.

Odell[8] states that tests may be rated according

to the following scale:

Coefficient of Reliability	Significance
.95-1.00	Among the very best. Only a few tests have reliability this high
.90-.94	Comparatively high. May be used for measurement of individuals.

---

[8] C. W. Odell, Educational measurement in High School. p. 65

.80-.89	Satisfactory for group measurement, but only fairly so for individuals.
.70-.79	Fairly satisfactory for group measurement, but not for individuals.
.00-.69	Should never be used alone for individual ratings and rarely for small groups.

APPLYING THE ODELL RELIABILITY SCALE TO THE TESTS
USED IN THIS STUDY.

In applying the above rating scale the tests used
in this study one may conclude:

1. Two of the individual tests given in Group I
with coefficients of correlation of .66 and .77 were
unsatisfactory for rating individuals.

2. Four of the individual tests given to Group I
had coefficients ranging between .80 and .89 were sat-
isfactory for group measurement but not for indivi-
duals.

3. Three of the individual tests given to group
I were satisfactory for measurement of individuals.

4. Six of the individual tests given to Group I
were satisfactory for group measurement but not for
individual.

5. Four of the individual tests were satisfac-
tory for measurement of individuals.

6

6. From correlations determined by adding scores of two successive tests all tests including 200 items were satisfactory for purposes of measuring individuals.

TABLE XIX

SHOWING DISTRIBUTION OF CASES IN GROUPS I & II

TRUE-FALSE AXIS
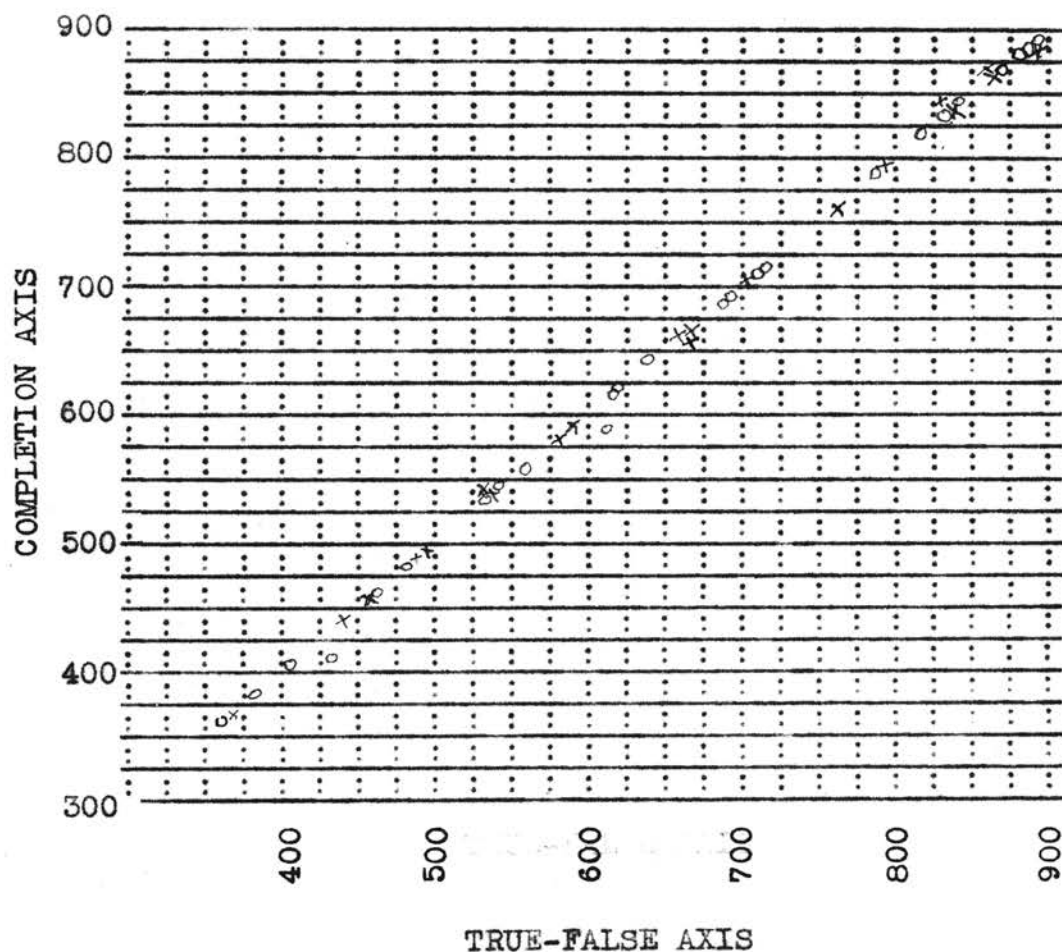
KEY

O— A GROUP

X— B GROUP

CHAPTER IV

STATEMENTS OF FINDINGS AND CONCLUSIONS

STATEMENT OF FINDINGS

From a comparative analysis of the data used in this study the following findings are reported:

1. Mean coefficient of correlation between true-false and completion type questions on ten groups of individual tests submitted to Group I is .873

2. Coefficient of correlation between true-false and completion questions on ten groups of individual tests submitted to Group II is .883

3. On 250 comparative scores recorded for Group I, 93 true-false scores exceeded the corresponding completion scores, with 157 completion scores higher than the corresponding true-false scores.

4. On 190 comparative scores recorded for Group II, 69 true-false scores were higher than the corresponding completion scores with 114 completion scores exceeding the corresponding true-false scores.

5. Group I correct completion responses were 1.71% greater than true-false responses.

6. Group II correct completion responses were 2.35% greater than true-false responses.

7. Coefficient of correlation between scores made by Group I , on 1000 true-false questions and 1000 completion questions was .97 PE.0091.

8. Coefficient of correlation between scores made by Group II on 1000 true-false questions and 1000 completion questions was .97 PE .0091

9. Increase in number of items in individual tests led to increase in coefficient of correlation, from mean of .878 on individual tests submitted to both groups, to .95 on 500 item tests and .975 on total of 1000 item tests.

10. Individual students all scored within 6.36% of identical scores on total number of questions included in the two types of tests.

CONCLUSIONS

On the basis of findings made in this study the following conclusions are made:

1. Whatever "different aspects of ability" may be measured by the True-False and the Completion types of objective examinations, these abilities are so closely related in amount, as to be predictable, within limits sufficiently narrow, to permit the use of either type for purposes of assigning grade marks to individual students, carrying work in the Social Science courses.

2. No definite individual disabilities, precluding comparable performance on the two types of tests, were discovered.

3. Use of Right minus Wrong formula in scoring true-false tests will produce approximately the same score as the completion test when tests are given under same conditions and over comparable material.

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